

200 nT. Using the space weather modeling framework (SWMF) we have simulated the possible response of the near-Earth space environment to a coronal mass ejection (CME) which took 18 hours to travel from the Sun to the Earth. We find that the magnetosphere was compressed to within 4 Earth Radii on the dayside and within geosynchronous orbit at all local times. We further find that the timings of the magnetospheric compressions align quite well with the magnetic field measurements of the 1859 storm. We will present results of the ionospheric cross polar cap potential, thermospheric densities and temperatures, ring current strength, and other magnetospheric, ionospheric, and thermospheric quantities through out the CME.

**SH52A CC: 519 A Friday 1030h**

**Solar Wind II**

**Presiding: K W Ogilvie, NASA**  
 Goddard Space Flight Center; I G Richardson, NASA Goddard Space Flight Center

**SH52A-01 1030h**

**MHD Simulation of the Breakout Model for CME Initiation**

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The "breakout" model has been proposed to explain coronal mass ejection (CME) initiation (Antiochos 1998; Antiochos et al. 1999). MHD simulations performed to date of the breakout model have used rather idealized models of the corona. In this work we will describe MHD simulations of the axisymmetric breakout model in which we include the important effect of the solar wind. In particular, our study will focus on the speed of the CMEs produced to see if the breakout model can explain observations of fast CMEs. Research supported by NSF (CISM) and NASA.

**SH52A-02 1045h**

**MHD Modeling of 3D Coronal Eruptions**

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We will investigate the evolution and stability of localized coronal magnetic fields as a model for the initiation of coronal mass ejections. Our emphasis will be on relating the topology of the magnetic field to its tendency to erupt. We will study three-dimensional coronal configurations that model the magnetic field of an active region embedded in a global dipolar coronal magnetic field, including the effect of the solar wind. Research supported by NSF (CISM) and NASA.

**SH52A-03 1100h**

**Correlation Among Flare Emissions, CME Acceleration and Enhanced Magnetic Reconnection**

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Recent solar observations have shown that the flare emission and the flux rope motion and the magnetic reconnection rate are closely related. Filament eruptions in the lower corona and CMEs in the higher corona are considered as the motion of flux ropes. From the flare-CME-filament observations it was observed that the most intense peak in the flare nonthermal emissions (hard X-ray, microwaves) and the maximum rate of increase in the total soft X-ray emission during the flare rise phase occur at the time of maximum acceleration of the flux rope's rising motion. Moreover, the magnetic reconnection rate obtained from the magnetogram data and horizontally expanding two-ribbon emissions is found to temporally correlate with the flux rope acceleration. We have performed resistive MHD simulations of the temporal evolution of flux rope motion and magnetic reconnection rate by employing a nonuniform anomalous resistivity. The simulation results show that the flux rope's accelerated rising motion is associated with an enhanced magnetic reconnection rate and thus an enhanced reconnection electric field in the current sheet during the flare rise phase. The results are in good quantitative agreement with observations of the acceleration of flux ropes (CMEs) for several CME-flare events. For the X-class flare events the peak reconnection electric field is  $\sim O(10^3 \text{ V/m})$  or larger, enough to accelerate electrons to over 100 keV in a field-aligned distance of 0.1 km and produce an impulsive hard X-ray emission observed during the flare rise phase, consistent with the estimated reconnection rate based on observations. Comparisons of the flux rope height, velocity and acceleration between our simulation results and observed CME-flare events will be presented.

**SH52A-04 1115h**

**Basic Properties of Anisotropic Stellar Wind Expansion in the Fluid Approach**

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In the solar wind, which is the prototype of stellar wind, two kinds of particle temperature anisotropy are observed. The proton temperature perpendicular to the interplanetary magnetic field (IMF) is larger than the parallel temperature in coronal holes at the origin of the fast solar wind. This anisotropy can be very large for atomic oxygen ions. This phenomenon is associated to wave-particle interactions. However, it is known that without any particle interaction, the opposite type of temperature anisotropy should develop in the expansion. This is probably the case in the slow solar wind source regions. In both cases, the electron seem to be rather isotropic in the corona but for less collisional medium the anisotropy should increase. This presentation is devoted to an analysis of dynamical properties of stellar atmosphere in the presence of the two kinds of temperature/pressure anisotropy. We choose to consider the one fluid approach in order to focus on the basic properties. The hydrostatic equilibrium conditions, the transcritical solution properties, the expansion velocity and the mass loss rate are analyzed for anisotropic isothermal and non-isothermal atmospheres. The extension of such analysis to two fluid models and multimoment models established for weakly collisional stellar winds are discussed.

**SH52A-05 1130h**

**Evidence for Coexisting Hot and Cool Polar Coronal Jets - Coordinated Observations of SOHO and TRACE**

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The polar coronal jets were first observed by SOHO instruments (EIT, LASCO, UVCS) during the last solar minimum. They were small, fast ejections originating from flaring UV bright points within large polar coronal holes. The polar holes disappeared at solar maximum and the jets were not visible anymore. Currently, however, as the Sun's activity declines, the polar holes again became permanent structures and new polar coronal jets were observed by specially designed SOHO Joint Observing Program (JOP 155). Their frequency of several events per day appear comparable to the frequency from last solar minimum. Also, the speed of  $\sim 400 \text{ km s}^{-1}$  at 1.6  $R_{\odot}$  is consistent with typical velocities of polar jets in 1996-1998. The ejections are believed to be triggered by the field line reconnection between the emerging magnetic dipole and pre-existing unipolar field. Existing models predict that the hot jet is ejected together with another jet made of cool material. The coordinated SOHO and TRACE observations within JOP 155 provide unique opportunity to test this prediction. We will present observations and discuss evidence supporting the model.

**SH52A-06 1145h**

**The Cassini Solar Conjunction Faraday Rotation Experiment**

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The Cassini Solar Faraday Rotation Experiment was conducted during the spacecraft's solar conjunctions in 2002 and 2003. A total of 160 hours of open-loop radio science data was collected at frequencies of 8 and 32 GHz (X- and Ka-bands), i.e., frequencies much higher than the plasma frequencies, but sufficiently low to undergo measurable Faraday rotation in the solar corona. During the 2002 experiment, four Coronal Mass Ejections crossed the signal ray path between Cassini and the Earth, each one imparting a different signature in the radio sounding data. The first occurred during the day of conjunction when the spacecraft's signal ray path passed to within approximately 2 solar radii of the Sun's center. The second occurred 1 day later at a solar offset distance of 3 solar radii. As shown by the EIT imager on SOHO, this event was oriented almost perpendicular to the first CME. It had a significant impact on the signal, causing the Ka-band translator on Cassini to lose lock on the uplink signal from Earth. The 3rd and 4th CMEs occurred 2 days later as a paired event when the Cassini solar offset was roughly 5 solar radii. The data received during the minimum solar elongation attained during the 2003 conjunction (proximate ray path point: 1.25 solar radii) were highly variable and represent the closest radio occultation measurement to the surface of the Sun. We discuss the Cassini Faraday Rotation data and develop models of the coronal electron density and magnetic field to simulate the measurements.

**SH53A CC: 220 C-E Friday 1330h**

**Violent Sun-Earth Connection Events of October-November 2003 II Posters (joint with SA, SM)**

**Presiding: T H Zurbuchen, University of Michigan; Q Zong, Boston University**

**SH53A-01 1330h POSTER**

**Spectral and dynamical properties of October-November 2003 storm injected electrons as observed by TSX5/CEASE**

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